openSAFETY

The open safety standard for all communication protocols
What does Safety normally look like?

- Safety Relays within the cabinet
- Safety application by discrete wiring
What does Safety normally look like?

- Safety Relays within the cabinet
- Safety application by discrete wiring

1 Additional DI/DO module
What does Safety normally look like?

- Safety Relays within the cabinet
- Safety application by discrete wiring

1. Additional DI/DO module
2. Extra wiring of safe sensors
What does Safety normally look like?

- Safety Relays within the cabinet
- Safety application by discrete wiring

① Additional DI/DO module
② Extra wiring of safe sensors
③ Extra wiring required to control safe actuators
What does Safety normally look like?

- Safety Relays within the cabinet
- Safety application by discrete wiring

1. Additional DI/DO module
2. Extra wiring of safe sensors
3. Extra wiring required to control safe actuators
4. Extra speed monitor for safe motion control functions
What does Safety normally look like?

- Safety Relays within the cabinet
- Safety application by discrete wiring

1. Additional DI/DO module
2. Extra wiring of safe sensors
3. Extra wiring required to control safe actuators
4. Extra speed monitor for safe motion control functions
5. Timer Relays for synchronous shutdown
What Safety should look like!

- Integrated
- Flexible
- Decentralized
- Certified
Reduced Wiring

- Additional Wiring
- Failure of standard I/O’s can affect safety

Hard-wired safety

• Safety Relais
• Standard DI

Integrated safety

• Less wiring
• Less components
Decreased Response Time

Benefit 2

Hard-wired safety

- Latency induced by relays

Integrated safety

- Fastest reaction time
- Smaller footprint of machine
Elimination of Setup Errors

Benefit 3

Hard-wired safety

- Significant risk of errors during maintenance

Integrated safety

- Electronic data sheet
- Maintenance logging
- Password protection
Intelligent Safety Features

Benefit 4

Hard-wired safety

• Only Safe Torque Off

Intelligent safe motion functions

Integrated safety

Function acc. IEC61800-5-2

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STO</td>
<td>Safe Torque Off</td>
</tr>
<tr>
<td>STO1</td>
<td>Safe Torque Off one channel</td>
</tr>
<tr>
<td>SBC</td>
<td>Safe Brake Control</td>
</tr>
<tr>
<td>SS1</td>
<td>Safe Stop 1</td>
</tr>
<tr>
<td>SS2</td>
<td>Safe Stop 2</td>
</tr>
<tr>
<td>SOS</td>
<td>Safe Operating Stop</td>
</tr>
<tr>
<td>SLS</td>
<td>Safely Limited Speed</td>
</tr>
<tr>
<td>SDI</td>
<td>Safe Direction</td>
</tr>
<tr>
<td>SLI</td>
<td>Safely Limited Increment</td>
</tr>
<tr>
<td>SMS</td>
<td>Safe Maximum Speed</td>
</tr>
</tbody>
</table>
Available Safety Protocols

- **ProfiSafe** is limited to Profibus and Profinet
- **CIPSafety** is limited to Rockwell protocols and SERCOS
- **Safety EtherCAT** is limited to EtherCAT
- **Safety Net p** is a proprietary protocol from PILZ
Safety market overview

• Available Safety Protocols
  – ProfiSafe is limited to Profibus and Profinet
  – CIPSafety is limited to Rockwell protocols and SERCOS
  – Safety EtherCAT is limited to EtherCAT
  – Safety Net p is a proprietary protocol from PILZ

• These protocols are proprietary or limited to a certain Fieldbus!
Safety market overview

• Available Safety Protocols
  – ProfiSafe is **limited** to Profibus and Profinet
  – CIPSafety is **limited** to Rockwell protocols and SERCOS
  – Safety EtherCAT is **limited** to EtherCAT
  – Safety Net p is a **proprietary** protocol from PILZ

• These protocols are **proprietary** or **limited** to a certain Fieldbus!

• These technologies are **NOT** compatible with each other!
Safety market overview

• Available Safety Protocols
  – ProfiSafe is limited to Profibus and Profinet
  – CIPSafety is limited to Rockwell protocols and SERCOS
  – Safety EtherCAT is limited to EtherCAT
  – Safety Net p is a proprietary protocol from PILZ
  – openSAFETY is open and available for any fieldbus

• openSAFETY is fully open and totally independent of the fieldbus!
Black channel mechanism
Black channel mechanism
Black channel mechanism
Black channel mechanism
Black channel mechanism
Black channel mechanism

Any fieldbus

POWERLINK  Modbus  SERCOS  EtherNet/IP  PROFINET
Black channel mechanism

Any fieldbus

POWERLINK  Modbus  SERCOS  EtherNet/IP  PROFINET
Black channel mechanism

Any fieldbus

POWERLINK  Modbus  SERCOS  EtherNet/IP  PROFINET
Black channel mechanism

Any fieldbus

POWERLINK  Modbus  SERCOS  EtherNet/IP  PROFINET
Errors and preventive/corrective measures

- No faults go undetected!
Frame structure

- The frame consists of two sub frames and is able to transport data up to 254 bytes of payload data.
One standard for all networks

EtherNet/IP

POWERLINK

SERCOS

PROFINET
One standard for all networks

- EtherNet/IP
  - POWERLINK
  - SERCOS
  - PROFINET
One standard for all networks

- EtherNet/IP
  - POWERLINK
  - SERCOS
  - PROFINET
One standard for all networks

EtherNet/IP

POWERLINK

SERCOS

PROFINET
One standard for all networks

EtherNet/IP

POWERLINK

SERCOS

PROFINET
One standard for all networks

EtherNet/IP

POWERLINK

SERCOS

PROFINET
One standard for all networks

EtherNet/IP

POWERLINK

SERCOS

PROFINET
One standard for all networks

EtherNet/IP

POWERLINK

SERCOS

PROFINET
One standard for all networks

EtherNet/IP

POWERLINK

SERCOS

PROFINET
One standard for all networks

EtherNet/IP

POWERLINK

SERCOS

PROFINET
openSAFETY is open and independent

- The world’s first 100% open safety protocol
- Totally independent from technical and legal aspects
- Supported by the international user organization EPSG
openSAFETY market

- openSAFETY is already operational on:
  - Ethernet TCP/UDP/IP
  - EtherNet/IP
  - Modbus TCP/IP
  - POWERLINK
  - SERCOS III
  - PROFINET

- openSAFETY covers 91% of Industrial Ethernet market!

Source: IMS Research
openSAFETY is certified

- TÜV certified protocol – IEC 61508 SIL3, PL e
- Certified Safe Motion Profiles – IEC 61800-5-2
- Approved as international safety standard - IEC 61784-3
Your benefits

• Component manufacturer
  – One time development investment
  – TÜV certified openSAFETY stack
  – Fastest possible Time-to-market

• OEM
  – Higher productivity
  – Reduced cost
  – Fast commissioning and easy maintenance
  – Minimal machine footprint

• Users
  – One safety standard for entire production plant
  – Simplified engineering and operations
  – Worldwide accepted technology
  – Total independence from technical and legal aspects
Users request openSAFETY to suppliers

- Nestlé requests their providers to support openSAFETY at Interpack fair

Bryan Griffen, Head of Electrical & Automation Engineering
Market leaders request openSAFETY
openSAFETY for all industries
Take advantage of a strong community

www.open-safety.org

http://www.linkedin.com/groups?gid=3816766